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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/138,429	08/24/98	HASHIM I	AMAT/2406/MD

IM22/0409

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EXAMINER	
MERCADO, J	
ART UNIT	**PAPER NUMBER**
1745	11

DATE MAILED: 04/09/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.	Applicant(s)
09/138,429	Hashim et al.
Examiner	**Group Art Unit**
Julian A Mercado	1745

☒ Responsive to communication(s) filed on *Jan 25, 2001*

☒ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *3* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) *1-3, 5, 6, 15, 16, and 18-20* is/are pending in the applicat

Of the above, claim(s) _____ is/are withdrawn from consideration

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *1-3, 5, 6, 15, 16, and 18-20* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

DETAILED ACTION

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Remarks

1. This Office Action is responsive to Applicant's amendment filed January 25, 2001.

The rejection of claims 1-3, 5, 6, 15, 16 and 18-20 under 35 U.S.C. 112, first paragraph has been withdrawn.

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Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tepman (U.S. Pat. 5,380,414) in view of Ghanbari *et al* (U.S. Pat. 5,455,197)

The rejection is maintained for the reasons of record and for the additional reasons to follow. Applicant has amended the claims to recite an annular magnet array being concentrically positioned about the surface of the substrate support.

Tepman was discussed in detail in the previous Office Action. A reiteration here follows. Tepman '414 teaches a sputtering chamber containing a target [2], a substrate [4] and a collimator [3] positioned therebetween. A magnet array [11] is disposed within the chamber to form a magnetic field at the surface of the substrate. (Col. 5 lines 23-28) The magnetic array is considered to be in an annular configuration such as shown in the magnetic array being in the

form of hemispherical "U-shaped" closed loops with the opposing magnetrons [11] coming out of the plane of the page and forming a closed circular ring. The examiner made this conclusion with the assumption that Figure 2 which shows the magnetic array [11] is a sectional view.

The examiner maintains that the magnetic array in Tepman is concentrically positioned about the surface of the substrate support. The magnetrons [11] are equidistant from both the edges of the wafer [4] and the center of the wafer. Applicant submits that such a configuration, i.e. concentrically positioned, would result in field lines being inherently substantially parallel to the substrate surface. The examiner concedes, thus, the field lines in Tepman are similarly considered to be parallel.

Additionally, Ghanbari is now relied upon to show that concentrically positioned magnetic arrays are well-known in the art, thus, one of ordinary skill in the art would have found obvious to modify Tepman's invention by employing a concentrically positioned magnetic array. (See Ghanbari, col. 4 line 62 *et seq*) The motivation for such a modification would be to enhance the flux of ions sputtered onto the wafer and optimize the crystal orientation of the sputtered film.

Applicant's arguments have been fully considered but are not persuasive.

Applicant submits that the magnet array of Tepman is "described as being 'U-shaped'". A careful reading of Tepman revealed no explicit disclosure that the magnet array is *described* to be U-shaped. [emphasis added] The examiner notes that Applicant did not provide column and lines in support thereof. It appears to the examiner that Applicant understands Tepman to

illustrate the magnet array as being "U-shape". In view of the Figures, the examiner understands why Applicant would construe such a configuration, however, Applicant is reminded that this Figure is a sectional view. The magnet arrays are believed to come out of the plane of the paper and form an annular, concentric arrangement around the surface of substrate support.

Arguments against Tepman positioning the magnetic array below the substrate are not persuasive as this argument is outside the scope of the present claims. Should Applicant desire to further amend the claims for this feature to be given patentable weight, the examiner notes that Ghanbari teaches the magnetic array to be substantially in the same plane as the substrate support. (See Figure 1)

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tepman in view of Ghanbari *et al* as discussed for claim 1 above, in view of Hsu (U.S. Pat. 5,589,039).

The rejection is maintained for the reasons of record. Hsu was relied upon to render obvious at least to the skilled artisan a target comprising a magnetic material which retains its magnetic properties upon deposition.

Applicant's arguments against Hsu have been fully considered, however they are not persuasive. Applicant submits that the cited portion (col. 1 lines 43-52) are wholly unrelated to generation of a magnetic field that is parallel to the substrate surface. In reply Applicant's attention is directed to column 2 line 66 *et seq*, which specifically states that "there is provided a biasing magnet structure for producing a parallel magnetic field that extends parallel to a substrate". Additional arguments against Hsu appear to be directed to this reference failing to

remedy any alleged deficiencies within Tepman. However, Tepman either alone or in view of Ghanbari *et al* as discussed above is maintained to teach or at least suggest the claimed invention, specifically that is recited within claim 1.

5. Claims 3, 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tepman in view of Ghanbari *et al* and Hsu as discussed for claim 2 above, and further in view of Boys *et al* (U.S. Pat. 4,500,409) and Applicant's admitted prior art.

The rejection is maintained for the reasons of record. Boys was relied upon to render obvious at least to the skilled artisan a long throw distance of at least 50 mm or a Ni/Fe alloy for the target. Applicant's arguments against Boys appear to be directed to this reference failing to remedy any alleged deficiencies within Tepman. However, Tepman either alone or in view of Ghanbari *et al* as discussed above is maintained to teach or at least suggest the claimed invention.

6. Claims 15, 16 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alex (U.S. Pat. 5,616,218) in view of Boys *et al* and Ghanbari *et al*.

Alex has been discussed in detail in the previous Office Action. A reiteration here follows. Alex teaches a grounded collimator [46] positioned between a target [43] and a substrate [49]. Boys is relied upon to teach a pressure of less than about 5 m Torr or a T/S distance of at least about 50 mm. Ghanbari is now relied upon to teach a concentrically positioned magnet array for forming a substantially parallel magnetic field. As discussed in the previous Office Action, at the time the invention was made, it would have been obvious to one of

ordinary skill in the art to further modify Alex's invention by providing a substantially parallel magnetic field at the surface of the substrate during sputtering. The motivation for such a modification would be to align the magnetic domains of the sputtered film by using a symmetrical magnetic field around a correspondingly shaped, e.g. circular, substrate.

Applicant submits that Alex does not teach grounding of the collimator. However, as discussed in the previous Office Action, a collimator such as taught in Alex's invention is requisitely grounded in that it is supported by the chamber wall and thus, the collimator and chamber wall would have the same ground potential.

Regarding Applicant's argument that Alex does not teach a substantially parallel magnetic field to the substrate via an annular magnetic field, Applicant is reminded that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Applicant's attention is directed to Ghanbari who specifically teaches employing a concentrically positioned magnetic array which, as Applicant has stated, would inherently result in a parallel magnetic field to the substrate.

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Conclusion

7. The prior art relied upon in this Office Action will not be provided since it is the same prior art made of record in the previous Office Action.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julian A. Mercado whose telephone number is (703) 305-0511.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gabrielle Brouillette, can be reached at (703) 308-0756. The official fax phone number for the organization where this application or proceeding is assigned is (703) 305-3599. The unofficial fax number is (703) 306-3429.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

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jam/April 5, 2001

STEPHEN KALAFUT
PRIMARY EXAMINER
GROUP 1700